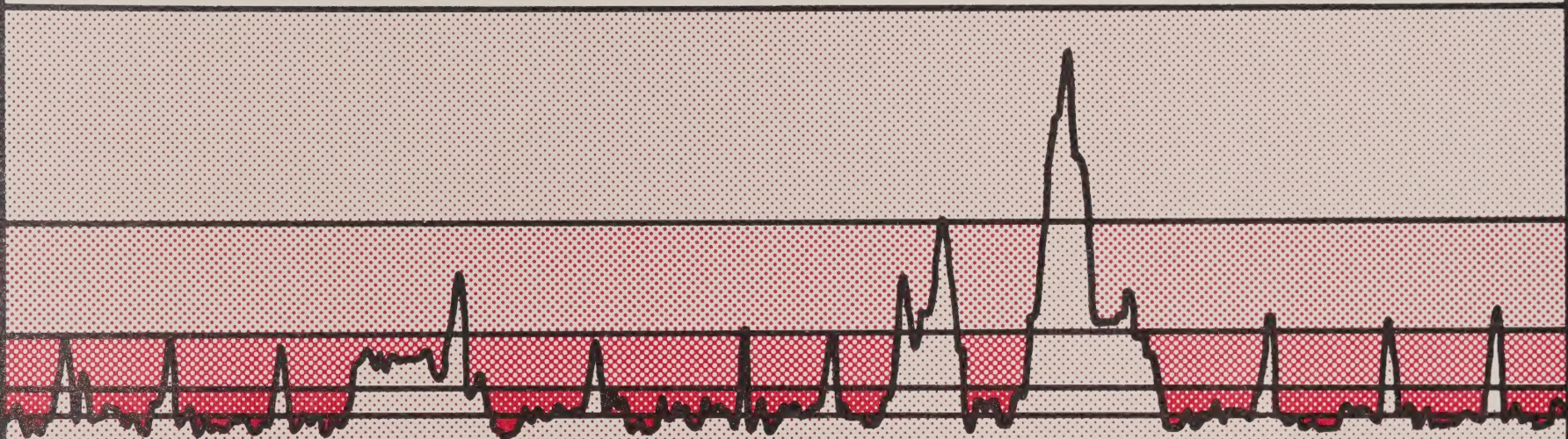


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An Element of the Oakland Comprehensive Plan

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An Element of the Oakland Comprehensive Plan

City of Oakland
September, 1974



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Introduction

The form of environmental pollution which we call "noise" has become a serious problem, not just to jackhammer operators and boilermakers but to all of us. Overall noise levels have increased so gradually over the years that the problem has been relatively unnoticed. Yet in recent years citizens, private industry, and government have begun to recognize the scope of the noise problem and to take steps to combat it. For example, Oakland has established controls on maximum noise emissions in certain zoning districts. The City has also persuaded the State of California to ban truck traffic from most of the MacArthur Freeway, substantially reducing this route's noise impact on many neighborhoods.

The increasing general concern about noise also has been reflected by a recent state law requiring that every city's general plan must contain a "noise element." This element must describe existing and projected noise levels from various transportation facilities, as well as present policies and programs to deal with noise problems.

This report is intended to serve as Oakland's Noise Element.¹ It was drafted by the City Planning Department, employing in part the noise data provided by various transportation agencies. The report:

- . presents some general background material on the nature of noise and its effects (Chapter 2);
- . describes noise levels specifically in Oakland (Chapter 3);
- . analyzes these noise levels so as to identify critical problem areas and issues (Chapter 4);
- . presents a series of goal and policy statements dealing with noise and outlines programs for carrying these out (Chapter 5).

The Noise Element is a part of the Oakland Comprehensive Plan--the City's "general plan." The Comprehensive Plan consists of a Policy Plan (a compendium of all basic goals and policies), together with such other components (area plans, Housing Element, etc.) as the City Council declares to be part of it. Furthermore, the goal and policy statements in the Noise Element have been reflected by appropriate additions and amendments to the Policy Plan.

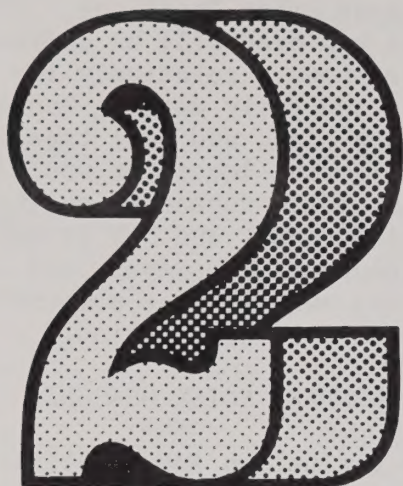
The Noise Element is by no means the final word on noise control planning in Oakland. For one thing, it is expected that additional data will soon become available. So, too, new techniques and programs for noise abatement may be developed. Furthermore, the whole science of community noise

¹The Element also includes certain additional maps, as explained on page 13.

measurement and evaluation has been evolving rapidly, and important new national or state-wide decisions on uniform standards may be made soon. For all these reasons, future refinements of the Noise Element can be expected.



noise (bourn)



The Nature and Effects of Noise

"Noise" can be defined, briefly but effectively, as "unwanted sound." To expand on this definition requires looking at (1) the physical characteristics of sound and (2) the kinds of effects on people which can make sounds "unwanted." This chapter will look at both these matters, as well as outlining the basic techniques available for reducing noise.

Physical Characteristics of Sound

Physically, sound is a fluctuation in atmospheric pressure caused by sound "waves" which move through the air something like the ripples from a pebble dropped into a pond. To describe any sound one must specify three things:

1. its intensity;
2. its pitch (or "frequency");
3. its time pattern (duration, repetition, and time of day).

Any and all of these can affect whether the sound will be regarded as "noise."

INTENSITY AND PITCH

The intensity of a sound--or more precisely, the "sound pressure level"--is the relative amount of sound energy radiating past a given point. By analogy, it is like the height of waves in the ocean.

The intensity of sounds which are audible by the ear is commonly measured in "decibels" (abbreviated dB). The decibel scale ranges from 0 to 140, with 0 corresponding to the lowest sound level that the healthy, unimpaired human ear can detect. However, this scale is logarithmic, and therefore decibels are not like linear units like miles or pounds. Each increase of 10 dB means that the acoustical energy is multiplied by 10. This means that a sound of 70 dB is 10 times as intensive as 60 dB, 100 times as intensive as 50 dB, and 1,000 times as intensive as 40 dB.

However, the relative "loudness" of sounds, as perceived by the human ear, does not closely match the actual relative amounts of sound energy. For example, while 70 dB is physically 10 times as intensive as 60 dB, listeners will tend to judge it as only twice as "loud."

The pitch (or frequency) of a sound--its "highness" or "lowness"--depends on the relative rapidity of the vibrations by which it is produced. In a low-pitched tone the sound waves are relatively far apart, while in a high-pitched one they are squeezed much closer together. Pitch is measured in cycles per second (also called hertz or hz.). Although some "pure tone" sounds contain only one frequency, more usually sound is a mixture of different frequencies. Sound with a wide, random range of pitches is called "broad-band."

Although the human ear can hear frequencies as low as 20 hz. and as high as 20,000 hz., it does not hear them all equally well. This means that people may assign different "loudnesses" to two sounds having identical intensities but widely differing frequencies.

To compensate for this tendency, various adaptations of the basic decibel scale have been devised. The most widely used is the "A-weighted sound pressure level," which is measured in A-weighted decibels--or dBA. This measurement can be made directly by standard sound level meters which electronically weight the sound intensities at different frequency ranges so as to discriminate against those ranges which the ear hears less well.

Table 1 lists some typical examples of sound intensities in dBA. Its right-hand column suggests how people will tend to judge the relative "loudness" of these sounds.

TIME PATTERN

Sounds also differ in their temporal patterns. A sound may be short or long-lasting; it may be steady, repetitive, or intermittent; and it may occur during the busy day or the quietness of night-time.

Over any given time period, the overall sound level constantly fluctuates as various individual noise events occur. This is best illustrated, as in Figure 1, by a continuous graphic level recording analogous to those used with seismographs or electrocardiograms. Although the two eight-minute samples depicted there were recorded in a suburban community, they suggest the kind of short-term variability one would find in many parts of Oakland.

Figure 1 also illustrates the way individual noise peaks tend to be superimposed over a residual--also called "background" or "ambient"--noise level which is more or less stable at any given location at any given hour. This residual level can be described as the sound which is "always there"--the pervasive sound level which remains after all identifiable individual sounds are eliminated.

Noise also varies over a 24-hour period in a longer-term pattern reflecting the effect of thousands of individual noise events. Figure 2

illustrates one such pattern which is probably typical of many urban locations. (The "L₁₀" and "L₉₀" scales employed will be defined shortly.) This example shows a relatively low noise level in the night and early morning hours, high levels during the day-time, and some tapering off in the evening. Different locations would show somewhat different patterns, depending on what noise sources were locally dominant and how strong those sources were at which hours. However, any location would still have its own distinct pattern of long-term variation over a 24-hour period.

SUMMARY NOISE MEASURES

To make the evaluation and comparison of noise levels practical, the kind of intricate detail shown in Figure 1 must be replaced by some form of summary measure. Acoustical experts have in fact used or proposed many such scales, and even argued heatedly about their relative merits. A few of the most common ones are described below (all of these are expressed in terms of the basic unit of dBA).

Maximum Peak

This approach simply measures the maximum intensity of any individual sound, either at any time or during a given period. It is simple to understand and measure, and relates well to certain noise regulations which may be in the same form. However, it really describes only a single noise event, and tells nothing about the pattern of sounds occurring below that level.

Energy Mean Equivalent Level ((L_{eq}))

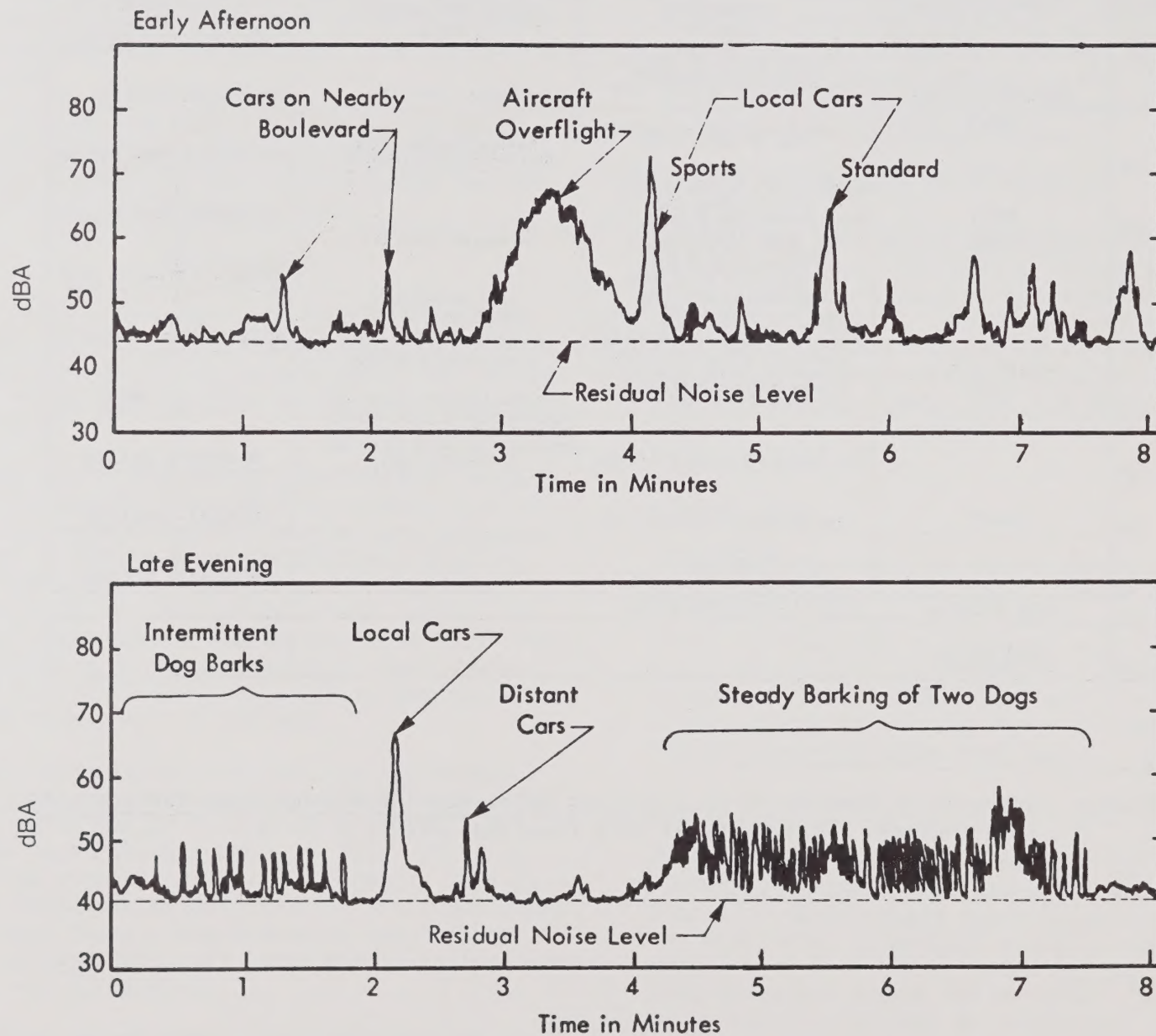
This is essentially an average of all the sounds occurring during a time period. Its value is that of a steady-state sound which would produce the same total acoustical energy during that period. As such, it reflects all the different loud and quiet sounds which occur. Unfortunately, it is fairly difficult to calculate.

TABLE 1
Sound Levels (dBA) and Loudness of Illustrative Noises
In Indoor and Outdoor Environments

dB(A)	OVER-ALL LEVEL	COMMUNITY (Outdoor)	HOME OR INDUSTRY (Indoor)	LOUDNESS (Human Judgment of Different Sound Levels)
130	UNCOMFORTABLY LOUD	Military Jet Aircraft Take-Off With After-Burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121)	120 dB(A) 32 Times As Loud
120		Turbo-Fan Aircraft @ Take-Off Power @ 200 Ft. (118)	Riveting Machine (110) Rock-N-Roll Band (108-114)	110 dB(A) 16 Times As Loud
110	VERY LOUD	Jet Flyover @ 1000 Ft. (103) Boeing 707, DC-8 @ 6080 Ft. Before Landing (106) Bell J-2A Helicopter @ 100 Ft. (100)		100 dB(A) 8 Times As Loud
100		Power Mower (96) Boeing 737, DC-9 @ 6080 Ft. Before Landing (97) Motorcycle @ 25 Ft. (90)	Newspaper Press (97)	90 dB(A) 4 Times As Loud
90	MODERATELY LOUD	Car Wash @ 20 Ft. (89) Prop. Plane Flyover @ 1000 Ft. (88) Diesel Truck, 40 MPH @ 50 Ft. (84) Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	80 dB(A) 2 Times As Loud
80		High Urban Ambient Sound (80) Passenger Car, 65 MPH @ 25 Ft. (77) Freeway @ 50 Ft. from Pavement Edge, 10 A.M. (76±6)	Living Room Music (76) TV-Audio, Vacuum Cleaner (70)	70 dB(A)
70			Cash Register @ 10 Ft. (65-70) Electric Typewriter @ 10 Ft. (64) Dishwasher (Rinse) @ 10 Ft. (60) Conversation (60)	60 dB(A) 1/2 As Loud
60		Air Conditioning Unit @ 100 Ft. (60)		
50	QUIET	Large Transformers @ 100 Ft. (50)		50 dB(A) 1/4 As Loud
40		Bird Calls (44) Lower Limit, Urban Ambient Sound (40)		40 dB(A) 1/8 As Loud
10	JUST AUDIBLE	[dB(A) Scale Interrupted]		
0	THRESHOLD OF HEARING			

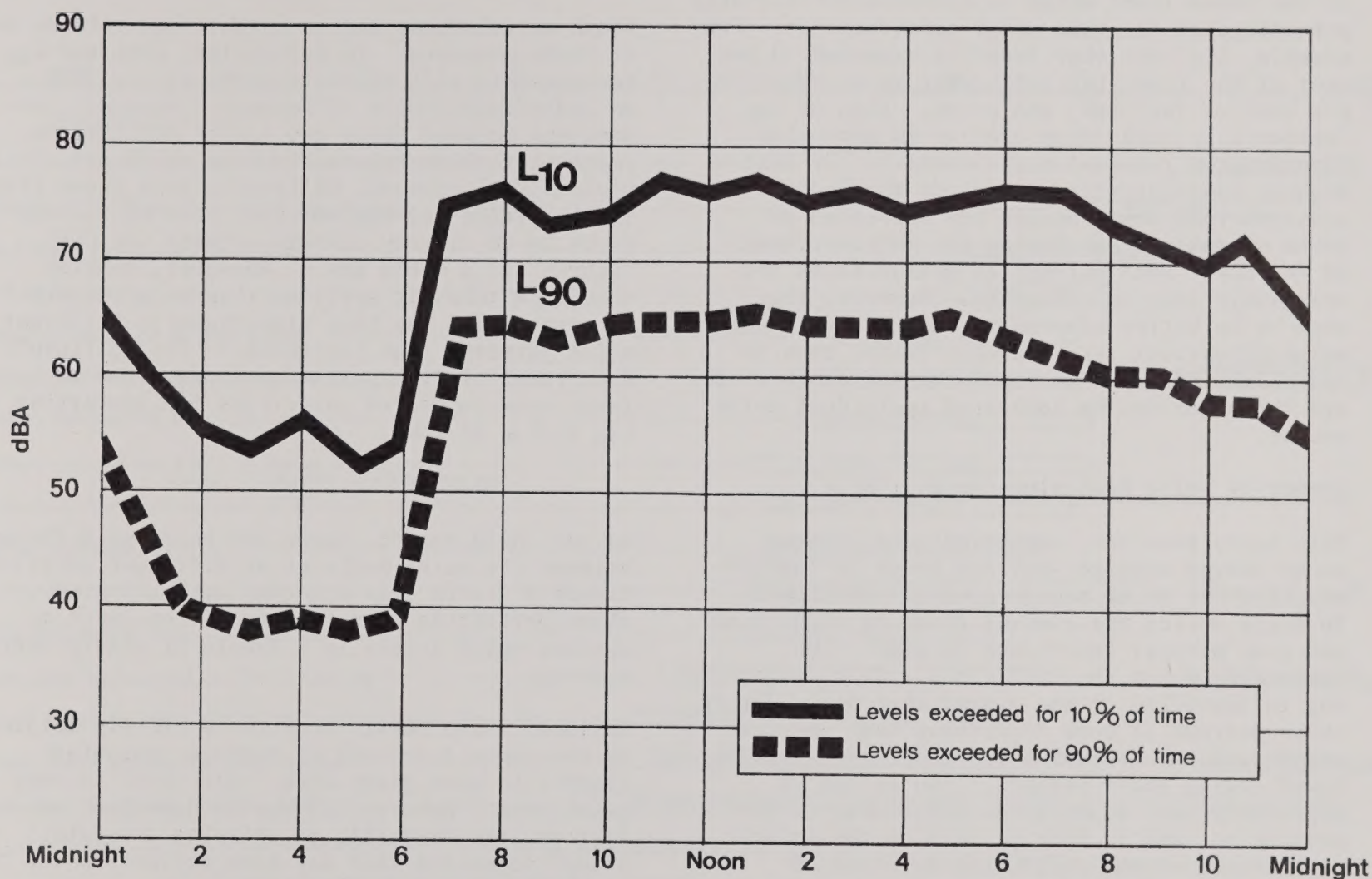
Source: Melville C. Branch, et al., Outdoor Noise and the Metropolitan Environment,
(Los Angeles: Department of City Planning, 1970), p. 2.

FIGURE 1
Two Samples of Outdoor Noise
In A Normal Suburban Neighborhood
With the Microphone Located 20 Feet
From the Street Curb



Source: Wyle Laboratories (for U.S. Environmental Protection Agency), Community Noise, (Washington: EPA), 1971, p. 6.

FIGURE 2
 L_{10} and L_{90} Sound Levels at Urban Site
 for Each Hour Over a 24-Hour Period



Source: Theodore J. Schultz, Noise Assessment Guidelines Technical Background, (Washington: USGPO), 1972, p. 22, as cited in Oxnard, Calif., Planning Dept., Oxnard-2000 GP Noise Element, Phase 1, Criteria and Background, September, 1973.

L₁₀ and Other Percentile Measurements

"Percentile" measurements are presented in terms of the sound level which is exceeded for a stated percentage of the time under consideration. For example, L₁₀ says what level is exceeded 10 per cent of the time; L₉₀ tells what is exceeded 90 per cent of the time, and so on. (L₉₀ or L₉₅, incidentally, are often used as an approximation for the residual noise level.) The Federal Highway Administration standards for Federally-assisted road construction are expressed in terms of maximum L₁₀ during the noisiest hour of the day. Such percentile measurements are relatively easy to calculate. However, they seem to be better adapted to relatively steady noise situations like freeways rather than to cases like airports or rapid transit lines which are characterized by separated individual noise events.

Community Noise Equivalent Level (CNEL)

This scale provides, essentially, a 24-hour sound energy average--but one which is "period-weighted" so as to assign greater importance to noise during the evening (7:00 to 10:00 p.m.) and even greater importance to night-time noise (10:00 p.m. to 7:00 a.m.). This weighting is justified on the ground that noise during these periods is more disturbing than day-time sounds and the ambient noise level is typically lower during these periods. The system is especially well adapted for assessment of airport noise, and in fact is used in the noise regulations of the California Division of Aeronautics. A disadvantage of CNEL, however, is that measurements require costly equipment, a staff of highly trained technicians, and the commitment of considerable man-hours.

Day-Night Average Sound Level (L_{dn})

This system is the same as CNEL except that the special period-weighting is applied only to the night-time hours (10:00 p.m. to 7:00 a.m.). This makes it somewhat easier to calculate. The Federal Environmental Protection

Agency has recently suggested¹ that L_{dn} be used, along with a 24-hour L_{eq} measure, as a uniform scale for evaluating community noise.

Rough correlations can be established between some of these measures. In particular, CNEL and L_{dn} measurements will normally agree within 1 dB--an indistinguishable difference. However, comparisons between these two scales and various percentile measurements are more difficult. Studies in Inglewood, California have shown that the L₁₀ value for the noisiest hour of the day tends to be closely correlated with the CNEL figures for a whole day.² (However, caution should be taken in applying this relationship to areas which may have significantly different noise patterns than Inglewood.) The California Department of Transportation is expected to issue some suggested guidelines for converting L₁₀ to L_{dn} or CNEL.

DIFFERENCES BETWEEN AREAS

As one would expect, there are enormous differences between the noise patterns at different locations. Figure 3, taken from a recent national study, shows percentile measurements of the day-time outdoor noise levels in a sample of widely varying settings.

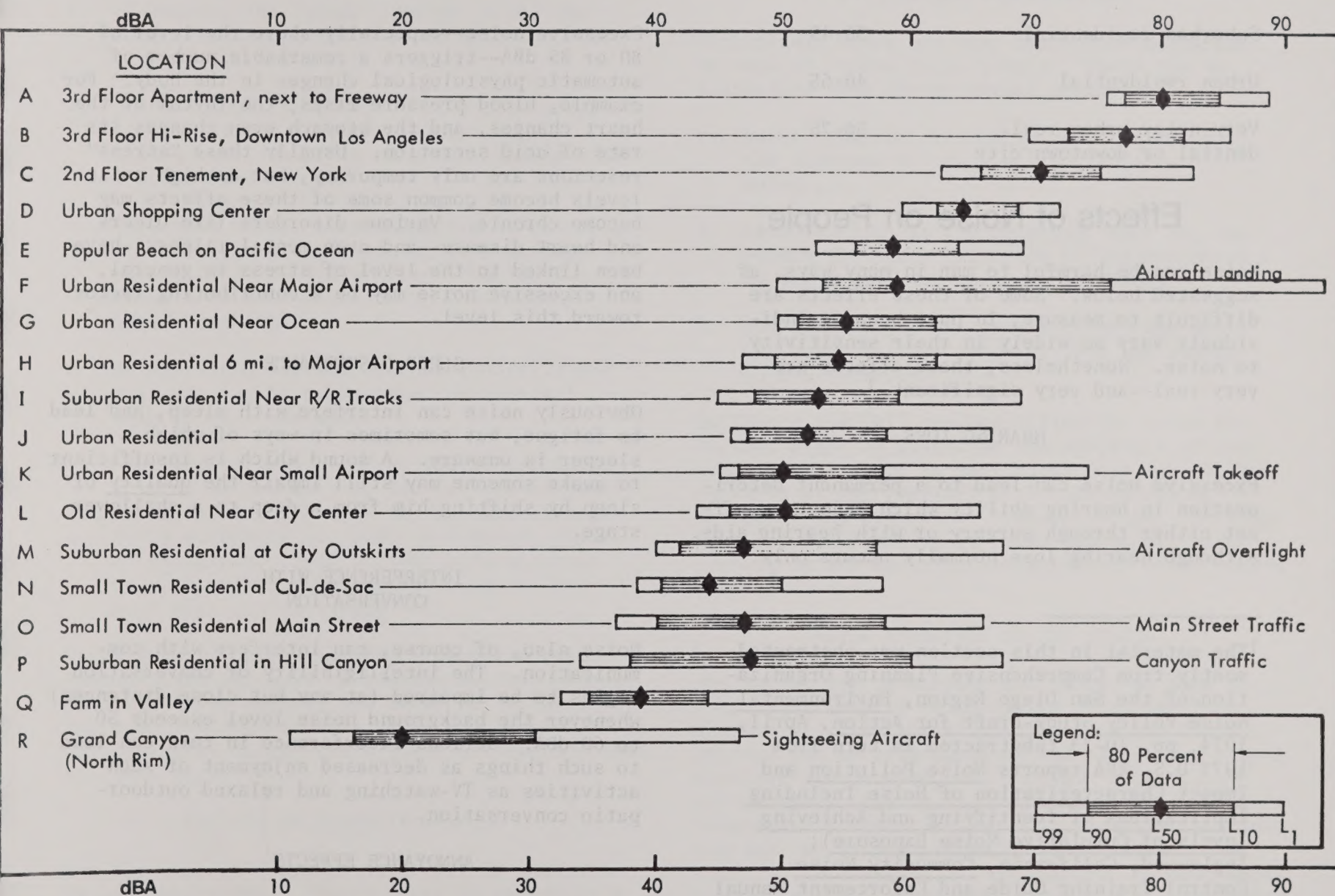
Residual noise levels tend to be closely related to the overall density of surface vehicular traffic in each given area. (At times in very quiet areas, however, it may be dependent on factors like birdcalls or chirping crickets.) One study³ suggested that day-time residual noise levels can be grouped into the following approximate ranges:

¹See pages 23 and 25.

²City of Inglewood, Environmental Standards Division, Inglewood General Plan Noise Element, Draft #2, November 6, 1972, pp. 4-5.

³Wyle Laboratories (for U. S. Environmental Protection Agency), Transportation Noise and Noise from Equipment Powered By Internal Combustion Engines, (Washington: EPA), 1971, p. 234.

FIGURE 3
Daytime Outdoor Noise Levels Found In 18 Locations
Ranging Between the Wilderness and the Downtown City,
With Significant Intruding Sources Noted¹



¹Data are arithmetic averages of the 12 hourly values in the daytime period (7:00 a.m.-7:00 p.m.) of the levels which are exceeded 99, 90, 50, 10, and 1 per cent of the time.

Source: Wyle Laboratories (for U.S. Environmental Protection Agency), Community Noise, (Washington: EPA), 1971, p. 18.

<u>Type of Area</u>	<u>Day-Time Outdoor Residual Noise Level in dBA</u>
Wilderness or rural	16-35
Suburban residential	36-45
Urban residential	46-55
Very noisy urban residential or downtown city	56-75

Effects of Noise on People

Noise can be harmful to man in many ways, as suggested below. Some of these effects are difficult to measure, in part because individuals vary so widely in their sensitivity to noise. Nonetheless, these effects are very real--and very significant.¹

HEARING LOSS

Excessive noise can lead to a permanent deterioration in hearing ability which cannot be offset either through surgery or with hearing aids. Although hearing loss normally occurs only

after prolonged exposure to intensive noise, more limited exposure to extremely loud sound has been known to cause permanent damage.

STRESS EFFECTS

Excessive noise--especially above the level of 80 or 85 dBA--triggers a remarkable number of automatic physiological changes in the body. For example, blood pressure rises, the rhythm of the heart changes, and the stomach even changes its rate of acid secretion. Usually these "stress" reactions are only temporary, but as high noise levels become common some of these effects may become chronic. Various disorders like ulcers and heart disease--and even mental illness--have been linked to the level of stress in general, and excessive noise may be a contributing factor toward this level.

SLEEP DISTURBANCE

Obviously noise can interfere with sleep, and lead to fatigue, but sometimes in ways of which a sleeper is unaware. A sound which is insufficient to awake someone may still impair the quality of sleep by shifting him from a deep to a shallower stage.

INTERFERENCE WITH CONVERSATION

Noise also, of course, can interfere with communication. The intelligibility of conversation begins to be impaired (at any but close distances) whenever the background noise level exceeds 50 to 60 dBA. Serious interference in turn can lead to such things as decreased enjoyment of such activities as TV-watching and relaxed outdoor-patio conversation.

ANNOYANCE EFFECTS

Another category which may overlap several of the ones above might be called "annoyance effects". Noise can distract, interfere with one's concentration, and even tend to make people nervous and irritable. Although the "annoyance thresholds" of

¹The material in this section was abstracted mostly from Comprehensive Planning Organization of the San Diego Region, Environmental Noise Policy Study-Draft for Action, April, 1974, pp. 10-23 (abstracted in turn from 1973 U.S. EPA reports Noise Pollution and Impact Characterization of Noise Including Implications of Identifying and Achieving Levels of Cumulative Noise Exposure); Inglewood, California, Community Noise Control Training Guide and Enforcement Manual (Draft Circular), June, 1971, revised 1972, pp. 3-4; and Pleasanton, California, Department of Community Development, Noise Element, Pleasanton General Plan, Draft Revision #2, December, 1973, pp. 2-3.

individuals vary greatly, some general rules can still be offered as to the kinds of sounds which tend to annoy large percentages of the people hearing them:

1. Obviously, the louder a noise is and the longer it lasts, the more annoying it will tend to be.
2. A sound consisting essentially of a single tone, like the screech of chalk on a blackboard, can often be more annoying than a broad-band sound.
3. Impulsive noises like hammering or riveting --or sometimes even sounds, like music, having definite "information" content-- tend to be more distracting than steady broad-band sounds.
4. As mentioned earlier, people generally are more annoyed by night-time (or evening) than by day-time noise.
5. The "intrusiveness" of an individual noise relates to how much it exceeds the residual noise level. (This is why acoustical engineers purposely introduce a moderate amount of background sound in some offices so as to mask noises which would otherwise be much more distracting.)

Other factors which may affect people's reactions include past exposure to similar noises; general feelings about whether the noise is "necessary"; and even feelings about a sound's association with physical danger (this sometimes happens with aircraft noise).

EFFECTS ON PROPERTY VALUES

All the above effects of noise may be reflected in economic terms. A noisy area is generally a less desirable place, not just to live in but also to work, shop, or play in. Such a decrease in desirability may result in reduced property values.

Basic Techniques For Noise Reduction

Fortunately there are many techniques which can be used to reduce noise levels. These can be classified into three general approaches:

1. noise reduction at the source (for example, the airplane or truck which creates a noise);
2. noise control at the receiver (that is, the person who hears the noise or the residence or other land use which he occupies);
3. modification of the transmission path which the noise follows in going from the source to the receiver.

In theory the full responsibility for noise reduction might be placed on the operators of the noise sources, but in many cases this may not be workable or may conflict with such values as efficient and economical transportation. In practice some combination of these approaches--depending on the specific situation--is often called for.

NOISE REDUCTION AT THE SOURCE

The technology is already available--at some price --to significantly reduce noise emissions from surface vehicles and aircraft. Auto and truck engines can be redesigned or sealed better, proper mufflers can be used, and special "quiet tires" can be used. Paving treatment can help to further reduce noise from tire contact. Even jet aircraft engines can be redesigned to reduce noise. New vehicles or aircraft can be required to meet definite acoustical standards, and at least some noise-reduction devices can be installed in existing ones.

Such basic remedies may take a long time to implement in some cases. However, there are also sim-

pler techniques which could yield faster results in some situations. One of these is the lowering of speed limits, since noise levels from automobiles, at least within certain velocity ranges, are strongly correlated with speed.

Non-transportation or "fixed point" noise sources can also be controlled. For example, pumps, compressors, and similar devices can be properly enclosed, and factories can be laid out to reduce the amount of noise radiating out onto surrounding properties.

NOISE CONTROL AT THE RECEIVER

The most extreme form of "noise control at the receiver" is the wearing of earmuffs, which is in fact required for many workers in noisy factories. More usually, though, what is called for is proper building design and intelligent site planning.

An obvious example would be orienting an apartment house so that its windows are on the side away from a nearby freeway. Improved window and door designs can significantly reduce inside noise levels. Walls can be properly insulated to reduce noise intrusions both from the outdoors and from "the neighbors upstairs."

MODIFICATION OF THE TRANSMISSION PATH

One way to modify the transmission path is to increase the distance between the noise source and the receiver. For every doubling of distance, the sound level will usually be reduced by 4 to 6 dBA--a significant reduction. The increased distance can be achieved by locating new highways, or rerouting existing traffic, as far as possible from noise-sensitive land uses. Conversely, it can involve keeping noise-sensitive land uses away from known major noise sources--for example, prohibiting new residential development near airports. Also, deep setbacks or buffer areas can be provided within developments which are near major noise sources.

Another approach is to put some kind of noise obstacle or barrier within the transmission path. For example, a highway may be depressed below grade so that the embankment next to the roadway serves as the barrier. Even where a highway is at grade, special barrier walls or earthen berms can be installed nearby. (Trees and shrubbery by themselves will do little to reduce noise transmission, unless they are very dense and deep, although they can provide visual and "psychological" shielding.)

In order to reduce noise to any significant degree, there must be a solid object blocking the line of sight between the source and the receiver. The barrier's effectiveness will depend on its distance from source and receiver, its height above a straight line connecting source and receiver, and the sound's frequency spectrum. Sound waves have some ability to "bend" over the top of a barrier. This is especially true for low-frequency noise, for which the barrier will be relatively less effective.

It should be noted that a short barrier along a roadway will provide very little noise reduction, even for the house right behind it. To provide any substantial benefit, such a barrier must extend for a considerable distance.



Noise Levels In Oakland

This report concentrates on the major transportation facilities which are the dominant noise generators in Oakland. As called for by the State law, existing and projected "noise contours" have been estimated for these transportation facilities. Such contours are analogous to the lines on a topographic map. Instead of connecting points of equal elevation, they join locations having equal average sound pressure level. For example, the "65 dBA" contour for a freeway runs through those points impacted by a noise level of 65 dBA coming from that freeway. In general the noisier a freeway or other noise source is, the farther one must back away from it to get down to a given contour line.

The contours estimated for each transportation facility are essentially based on the noise coming from the use of that facility. In other words, no attempt was made to add that noise to the underlying background level or (except at some trafficway intersections) to the noise coming from other transportation sources. Further-

more, the contours are necessarily generalized estimates. They are intended only for general planning and administrative purposes, and do not try to establish precise levels at particular sites.

Because of the degree of complexity which the State law requires in the noise contours, it was impracticable to publish them fully in this report. The actual detailed maps--which are a part of the Noise Element--are maintained on file in the City Planning Department (Oakland City Hall), where they may be examined. This report does, however, contain generalized maps illustrating selected contours for some transportation facilities.

General Noise Pattern

The dominant noise sources are automobile and truck traffic, with aircraft being an increasingly prevalent source. In some places noise also comes from rapid transit lines, railroads, industrial plants, and even such things as lawnmowers and barking dogs.

As one would expect, there are great differences between the various parts of Oakland. An overall noise level "relief map" would likely show a generally high "plateau" covering the downtown area, West Oakland, and much of North Oakland--reflecting these areas' high density of surface traffic and their general nearness to freeways, industry, or railroads. This plateau would be crisscrossed with "ridges" corresponding to especially high noise levels along freeways or other prominent routes. The plateau would also extend southwards along the Nimitz Freeway and the industrial belt and then (near the southeastern end of the City) broaden out to extend down to the Airport. Generally, the remainder of East Oakland would have somewhat lower noise levels, except for ridges along major routes, while most sections of Oakland northeast of the MacArthur Freeway would be substantially quieter.

Perceived noise levels have generally been in-

creasing, and in some cases may keep on doing so in the future. Increasing traffic, increasing use of noise-producing machinery, and (in some areas) the development of formerly vacant land have contributed to this.

Trafficway Noise

Heavy trucks, especially large vans and trailer-trucks, are a critical noise source along many freeways and streets. The U. S. Department of Transportation has estimated that four trucks can produce the same noise impact as 84 automobiles.¹ Trucks can be especially noisy on steep upgrades.

Buses can sometimes be as noisy as trucks, especially if poorly maintained.

Though most automobiles are individually quieter than trucks, collectively they are of enormous significance because there are so many of them. (However, sports cars and motorcycles can be as noisy as trucks, depending largely on how they are maintained and operated, and many people may think of them as even more annoying.)

Less common, but especially intrusive, noise also comes from the warning sirens of fire engines, patrol cars, and ambulances.

Fairly high noise levels can be found immediately along all significant trafficways in Oakland, with the actual levels generally varying according to traffic volume, speed, and the proportion of truck traffic. Other factors such as topography may also affect noise impact.

Map 1 illustrates sound levels for State freeways, which are by far the noisiest class of trafficway. It shows existing (1973) and projected (1995) 65 dBA L₁₀ contours for the

noisiest hour. Because of several factors, these estimates (made by the California Department of Transportation) may be on the conservative side; that is, they may tend to over-estimate noisiness. For one thing, they do not assume any noise reduction on nearby blocks because of intervening buildings; in many cases factors such as this would tend to squeeze the noise contours somewhat closer to the roadway, or at least cause many small-scale undulations in the simplified theoretical contour lines. Furthermore, the 1995 freeway contours do not assume improvements in engine or vehicle design, or installation of noise barriers, which might otherwise serve to reduce noise.²

Nonetheless, in a general way these contours illustrate that much of Oakland is significantly impacted by freeway noise. One reason for this impact is that most freeway sections are either at grade or elevated. The planned portion of the Grove-Shafter Freeway between about 11th and 18th Streets will be depressed, and the squeezing together of the projected contours here illustrates what a big difference this kind of cross-section can make.

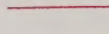
Also of interest are the relative widths of the corridors between the 65 dBA contours for different freeways. The great corridor widths along the Bay Bridge approach and the Nimitz Freeway, due to heavy truck traffic combined with large automobile volumes, should be noted. Along the Nimitz through East Oakland, for example, the distance from the roadway edge out to the 65 dBA contour for 1973 is typically about 900 feet. The 65 dBA corridor is also quite wide along the western portion of the MacArthur Freeway, but this narrows significantly near Grand Avenue--reflecting the fact that heavy trucks are banned on this freeway east of Grand Avenue. The Grove-Shafter Freeway, which does carry truck traffic, has a fairly wide noise corridor. The relative narrowness of the band along the Warren Freeway

¹San Diego, California, Planning Department, Noise Element (draft), June, 1974, p. 6.

²See footnote on page 16.



 65 or more dBA L_{10} in 1973

 65 or more dBA L_{10} in 1995

See Qualifications on pp. 14 and 16

Map 1

Selected Noise Contours From Freeways



reflects that route's comparatively low automobile and truck traffic.

Most of these freeway noise corridors spread outwards between 1973 and 1995, basically due to assumed traffic increases.¹ For example, the 65 dBA contours along the Nimitz through East Oakland expand on each side by 160 feet or more.

In addition to the existing and definitely planned freeways shown on Map 1, the Circulation Element of Oakland's Comprehensive Plan mentions certain "Possible freeway(s) ...need and alignment uncertain":

1. an extension of Route 13 (the Warren Freeway) from the MacArthur Freeway down to the Metropolitan Oakland International Airport, crossing East Oakland somewhere between High Street and the San Leandro city limits;
2. A "Route 61" which could run generally parallel to the Nimitz, through the Oakland Airport, Alameda, the outer portions of West Oakland, and Emeryville, with a leg extending up from Alameda to connect with the Grove-Shafter Freeway.

It is impossible to estimate noise contours for these "possible" freeways without knowing their alignment and design. Some general idea of their noise impact might be inferred, though, by looking at comparable existing freeways.

Significant noise corridors can also be identified along various trafficways other than free-

¹However, the 1995 corridors will be significantly narrower--perhaps narrower than the 1973 ones--if the traffic increases assumed by the State do not occur, if noise barriers are installed, and especially if vehicle noise emission controls such as those described below on page 34 are retained (or established) and enforced.

ways. For example, along the southeastern portion of East 14th Street, the 65 dBA L₁₀ contours for 1973 are some 250 to 300 feet from the roadway edge, and this distance is projected to increase to 300 to 350 feet by 1995.¹

Aircraft Noise

Parts of Oakland experience noise from aircraft operations involving Metropolitan Oakland International Airport and Alameda Naval Air Station. Selected contours for these are shown on Map 2. However, some noise is also produced by high-altitude overflights to or from San Francisco International Airport, as well as by miscellaneous smaller aircraft operations.

Oakland Airport is essentially two airports:

1. the "north airport," which basically handles general aviation as well as some maintenance of commercial airliners;
2. the "south airport," which accommodates almost all of Oakland's commercial flights on its single runway by the edge of the Bay.

Some noise is generated by routine ground "run-up" testing of aircraft engines, although this represents an insignificant part of the overall sound level generated by the operation of the airport. Noise from general aviation is relatively unimportant, except for certain types of general aviation aircraft. The main noise source consists of commercial flights, and the number of these has been growing rapidly. The Aviation Element of the Association of Bay Area Governments (ABAG) Regional Plan--which is based on regional studies of many factors including airport access and noise impact--allocates a very large share of future Bay Area passenger growth to Oakland. The Port of Oakland estimates that, consistent with the ABAG plan, there could be some 179,000 aircraft operations (excluding helicopters) at Oakland in 1985, compared with about 70,000 in 1973. If such growth occurs by 1985, the Port estimates that the Airport's 65 dBA CNEL



- 65 dBA or more CNEL
in 1972 - 73 (1974 for Alameda NAS)
- 65 dBA or more CNEL
in 1985

Map 2

Selected Noise Contours From Airports



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contours will spread out by 1985 approximately as shown on Map 2. (Noise levels beyond 1985 cannot be forecast accurately at this time.)

These contours expand less than they might otherwise because the noise projections assume various future improvements in noise reduction techniques. Much of the potential impact area affected by the contours is in the Bay.

The ABAG plan includes a long-range proposal for additional aircraft operations capacity through the construction of a new runway off-shore from the existing main runway. If such capacity were provided, passenger volumes would be increased, while at the same time noise levels in nearby populated areas could be reduced by moving many flights--and their resulting noise contours--farther into the Bay.

Map 2 also shows the 65 dBA CNEL contour produced, in Oakland, by Alameda Naval Air Station. Some of the flights here are Naval Reserve practice or training operations, while other flights involve planes coming in for loading on the aircraft carriers which dock here.

Since the Navy anticipates no basic change in operations here, it is assumed that the 1985 noise contours will be the same as those for 1974. These contours show, in particular, a wedge of fairly high noise levels extending into Oakland east of Jack London Square. This is associated with an east-west runway which, however, the Navy uses only when wind conditions require it--and almost never at night.

Flights to or from San Francisco International Airport, as well as approach or departure paths for Oakland and Alameda NAS, affect many parts of Oakland which are not indicated on Map 2.

Because of their altitudes, these flights typically generate noise which is audible over very extensive areas--for longer periods but at

lower levels than the thresholds for which airport-centered contours are shown. However, the noise from these flights may become more and more intrusive as air traffic increases. It may tend to be especially noticeable in areas, like the Oakland Hills, where normal background sound levels are relatively quiet and the ground elevation is higher.

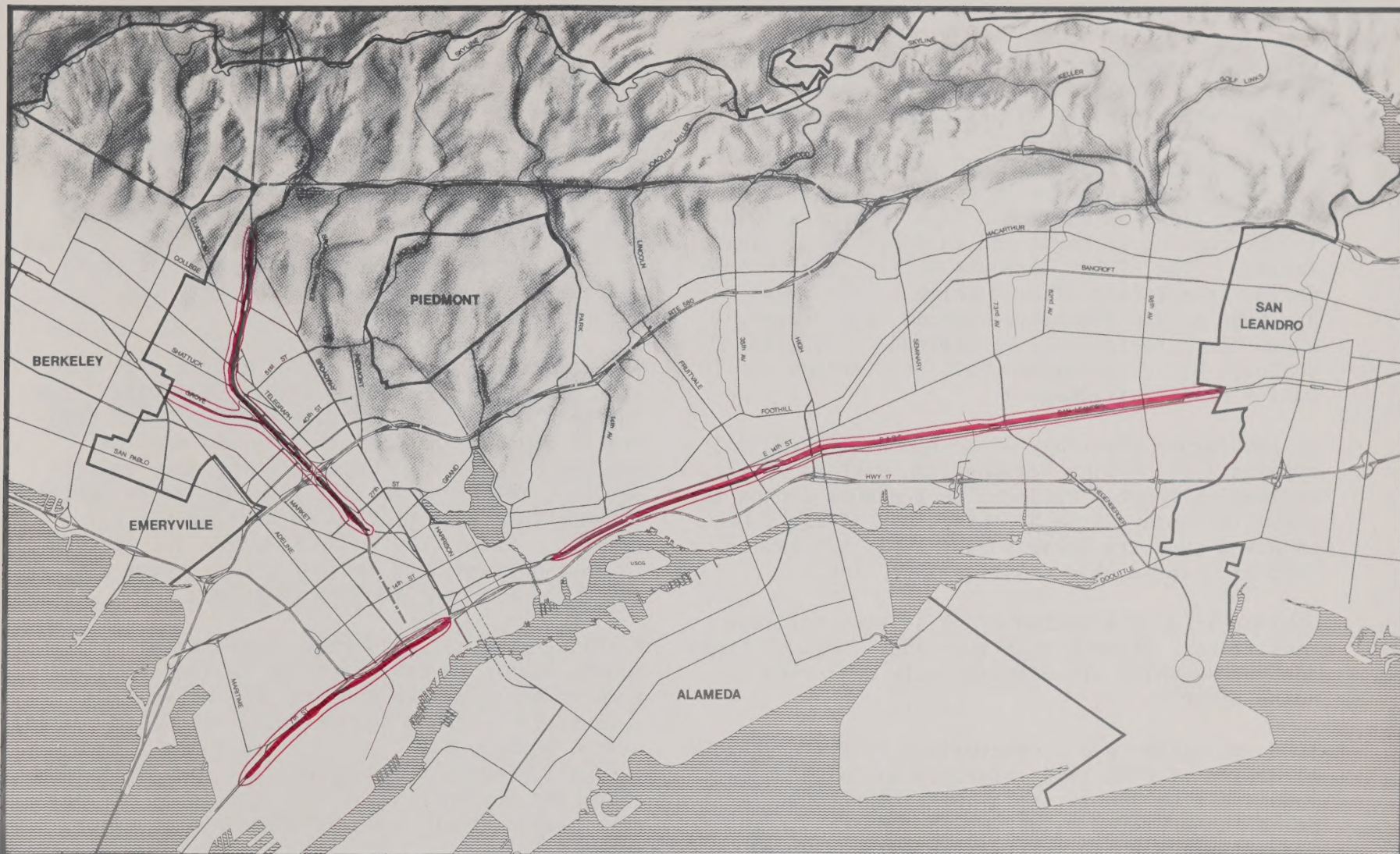
Finally, miscellaneous smaller aircraft operations, such as the Oakland Police Department's helicopter patrols, also produce some noise. However, their overall noise impact is not great.

Other Transportation Noise

Map 3 illustrates generalized 65 dBA L_{dn} noise contours for Oakland's newest transportation component--the Bay Area Rapid Transit (BART) facilities. These are shown, of course, only for those sections where BART is above ground. It should be noted in passing, though, that even the confined noise levels within BART's subway stations are much lower than in older rapid transit systems like those of New York and Chicago.

Nevertheless, the passage of trains on above-ground lines does generate a quite noticeable amount of sound. Some of this is inevitable because BART runs on steel rails. Recently some additional noise has been generated by special "scrubbers" which have been installed as a back-up train-detection safety measure. (BART plans to replace these with a quieter version.) Another factor is that, except for the raised "third rail," there are presently no walls or other noise barriers at wheel height along the elevated lines (other than right at some elevated stations).¹ However, in many cases the noise

¹The contours do not assume any noise attenuation due either to new barriers in the BART right-of-way, or to existing or new buildings outside it.



- 65 dBA or more LDN in 1974
- 65 dBA or more LDN in 1995

See qualifications on p. 18

Map 3

Selected Noise Contours From Rapid Transit



Scale: 1" = 1/2" (1:12,000) by North American Map, San Francisco, Ca. For use by City of Oakland only. Reproduction of map or portions thereof without the written permission of North American Map is prohibited.

from BART trains is largely masked by auto and truck noise from the freeways and important streets which the BART lines typically follow.

A comparison of 1974 and 1995 contours on the map shows some increase in overall levels along the BART lines in Oakland. This is basically due to the running of more, and in some cases longer, trains. (The "1974" contours reflect the interim period immediately after opening of the Trans-Bay tube to San Francisco; during this period, hours of operation will be limited. The 1995 contours basically assume full utilization of BART's present trackage.)

In the future there may be an additional rapid transit line serving Metropolitan Oakland International Airport. While noise contours cannot be drawn for such a line at this time, it might be inferred that its noise impact would not exceed that of a comparable existing BART line.

Oakland is also affected by noise from railroad facilities. These are of two types--through lines and yards--which are significantly different in noise effects.

Line operations are characterized by the passage of trains at wide time intervals but with individual trains generating a quite high sound level. Noise is generated mainly by the engines in the locomotives and the interaction of wheels and rails, although whistles are also an important source in a city like Oakland with many grade crossings. The noise level from the cars (though not from the locomotives) tend to increase quite significantly with increasing speed. Wheel condition and track alignment, grade, and condition are also significant factors.¹

Yard or terminal operations are a composite of

many different switching, classification, and/or maintenance activities. Typically some of these are going on at any given time of day or night. Noises range from the screeching sounds of car retarders to the constant low rumble of idling locomotives. The common low-frequency sounds are of special interest since they are not rapidly attenuated by low barriers (such as strings of cars) or by atmospheric absorption of sound, and therefore may be audible for very long distances from the yard.²

The main railroad lines expose fairly wide corridors of land to significant noise levels. The Southern Pacific and Western Pacific lines (generally running through or along the edge of Oakland's industrial belt) are the main contributors. The Santa Fe line (through North Oakland) is much less of a problem because of its low traffic. Large S.P. and W.P. yards are located in West Oakland, and the operations there are quite audible over much of that area.

Finally, some miscellaneous "transportation" sounds should be noted. These include foghorns from ships along the Estuary, the noise from motorboats (such as the periodic speedboat rallies at San Leandro Bay), and the occasional (even illegal) motorbike riding on some open hillsides above the Warren Freeway. At the scale of concern here, though, none of these are of major impact.

Fixed-Point Noise

In addition to transportation noise, Oakland is subject to an enormous variety of what might be loosely termed "fixed-point" noise sources. Many of the resulting sounds annoy people not so much because of their physical intensity as because of unusual or specially irritating character.

¹Wyle Laboratories, Assessment of Noise Environments Around Railroad Operations (July, 1973), pp. 2-2 through 2-5.

²Ibid., pp. 2-5 through 2-11.

There is no clear pattern of "noisy industries" in Oakland. Most of the City's industrial belt is a mixture of quiet activities with noisy ones. Some of the most insistent industrial noises come from the clanging magnets and presses of the scrap metal yards along the Estuary, and fortunately these and some other noisy industries near the shoreline are fairly well insulated from areas of housing. Along the industrial belt's inland edge, however, there are many residential streets where noise from nearby workshops (or even junkyards) is quite evident. Furniture or wood-working shops, with the high-pitched whine of buzz-saws escaping through open loading-area doors, are frequent offenders.

Commercial areas can also generate a good deal of noise--from such establishments as car washes or body shops.

Even residential areas are not exempt from annoying fixed-point sounds. Here, noise comes from a great number and variety of household mechanical devices such as air conditioners, TV's, stereos, power operated chain saws, power mowers, and power hedge trimmers.

One special category of fixed-point noise is associated with construction activities, which may occur in any type of area. Although construction noise at a given location is not permanent, it can have major impact while it lasts. One particularly annoying example of construction noise is the operation of pile-drivers, which can be very disturbing in high-density areas like downtown Oakland.

Critical Problems and Issues

This chapter evaluates the noise levels which have been described, to identify crucial problems and issues.

Standards For Evaluation

To judge whether a given noise level in a given location is a serious problem, one must know (1) what land uses are found there and (2) what the relative "noise tolerance" of each use is. Obviously an area of homes, where activities like sleep and relaxation are basic, can tolerate much less noise than, say, a heavy industrial district where fairly high sound levels are accepted as a normal part of the work environment. What is really needed is some set of noise standards for different land use categories, based on the kinds of human activities which are important under each.

Many public agencies and noise consultants have in fact proposed such standards, and some of these standards have been written into official

regulations or guidelines. Table 2 shows one example which was developed by the U. S. Department of Housing and Urban Development (HUD) with aircraft noise in mind but which seems to have relevance for other purposes, too. It is expressed in terms of CNEL or L_{dn} scales as well as the CNR ("Composite Noise Rating") scale often used in airport noise studies. This example is especially interesting because it distinguishes many different land use categories and because it employs several tolerance ranges which depend partly on the degree of building noise insulation.

HUD uses somewhat similar standards in considering proposals for Federally assisted housing. The State airport regulations in the California Administrative Code establish a CNEL value of 65 dBA as the maximum acceptable exterior noise level for low-rise residential buildings of standard construction.¹ The State's new Noise Insulation Standards for apartment buildings are expressed in terms of interior noise levels, but compliance must be demonstrated through an acoustical analysis report for any site within a 60 dBA CNEL contour from various freeways and other noise generators.

Table 3 summarizes a set of "levels," expressed in terms of L_{dn} and L_{eq} , which the U. S. Environmental Protection Agency believes are called for to guard against certain stated adverse effects.

The Federal Highway Administration has its own standards for noise impact from Federally assisted highways. These are stated as maximum L_{10} levels, during the noisiest hour, for various land use categories. The basic standard for residential outdoor living areas is 70 dBA.

Still a different approach is taken by the City of Inglewood, California, which has developed several supplemental standards for each land use

¹This standard applies from the beginning to new airports. For existing airports the 65 dBA standard will be applicable by 1986 as described in the Code.

TABLE 2

H.U.D. Acceptability Ranges of Exterior Noise Level By Land Use Category

LAND USE	AVERAGE NOISE LEVELS						
	Ldn or CNEL – Community Noise Equivalent Level						
	55	60	65	70	75	80	85
	CNR – Composite Noise Rating						
	85	100	115	130			
Residential- Single Family, Duplex, Mobile Homes							
Residential- Multiple Family							
Transient Lodging							
School Classrooms, Libraries, Churches							
Hospitals, Nursing Homes							
Auditoriums, Concert Halls, Music Shells							
Sports Arenas, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							
Office Buildings, Personal, Business and Professional							
Commercial- Retail, Movie Theaters, Restaurants							
Commercial- Wholesale, Some Retail, Industrial, Manufacturing, Utilities							
Manufacturing, Communications (Noise Sensitive)							
Livestock Farming, Animal Breeding							
Agriculture (Except Livestock), Mining, Fishing							
Public Right-of-way							
Extensive Natural Recreation Areas							

**CLEARLY ACCEPTABLE**

The noise exposure is such that the activities associated with the land use may be carried out with essentially no interference from aircraft noise. (Residential areas: both indoor and outdoor noise environments are pleasant.)

**NORMALLY ACCEPTABLE**

The noise exposure is great enough to be of some concern, but common building construction will make the indoor environment acceptable, even for sleeping quarters.

**NORMALLY UNACCEPTABLE**

The noise exposure is significantly more severe so that unusual and costly building construction is necessary to insure adequate performance of activities. (Residential areas: barriers must be erected between the site and prominent noise sources to make the outdoor environment tolerable.)

**CLEARLY UNACCEPTABLE**

The noise exposure is so severe that construction costs to make the indoor environment acceptable for performance of activities would be prohibitive. (Residential areas: the outdoor environment would be intolerable for normal residential use.)

SOURCE: U.S. Department of Housing and Urban Development, Aircraft Noise Impact, Planning Guidelines for Local Agencies, by Wilsey & Ham and Bolt, Beranek and Newman, 1972.

TABLE 3
Summary of Noise Levels Identified by EPA
As Requisite to Protect Public Health and Welfare
With an Adequate Margin of Safety

Effect to be Guarded Against	Maximum Noise Level ¹	Area
Hearing loss ²	$L_{eq}(24)$ 70 dBA	All areas
Outdoor activity interference and annoyance	L_{dn} 55 dBA	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use
	$L_{eq}(24)$ 55 dBA	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	L_{dn} 45 dBA	Indoor residential areas
	$L_{eq}(24)$ 45 dBA	Other indoor areas with human activities such as schools, etc.

¹Basically, $L_{eq}(24)$ represents the sound energy averaged over a 24-hour period.

²The hearing loss level identified here represents annual averages of the daily level over a period of forty years.

Source: U. S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety (Washington: March 1974), page 40.

category. These are a maximum L₁₀ level, two other maximum percentile levels--and an absolute maximum dBA value designed to deal with exceptional individual noise peaks.

Despite the obvious differences between the above and other sets of noise standards, there is still enough broad agreement among them to permit the kind of general evaluation done in the next section.

Problem Areas and Issues

Judged by criteria like those above, a very large proportion of Oakland is noisier than is desirable. This is particularly so for many residential properties which directly abut freeways or heavily traveled streets. Beyond these, however, there are entire areas which suffer significant noise intrusions.

Map 4 attempts to single out those sections of Oakland now having the most serious noise problems. It is not meant to imply a lack of problems elsewhere.¹ The sections shown on the map are outlined only schematically, and even their identification is tentative. Further noise analysis might result in a redrawing of this map.

In addition, noise problems could develop in some locations depending on the resolution of issues involving new or expanded circulation facilities. Map 4 shows two significant loca-

tions affected by such circulation issues.

AREA A²

The portion of the Grove-Shafter Freeway which runs through North Oakland and Rockridge exposes large numbers of nearby residents to substantial noise levels. (Also in this section is Childrens Hospital of the East Bay, which directly adjoins both the freeway and the elevated BART line on Grove Street.) Since this whole freeway section is elevated, efforts to reduce the noise through special barriers may be more difficult. Since the freeway is more visible, local residents may be more conscious of the noise impact.

AREA B

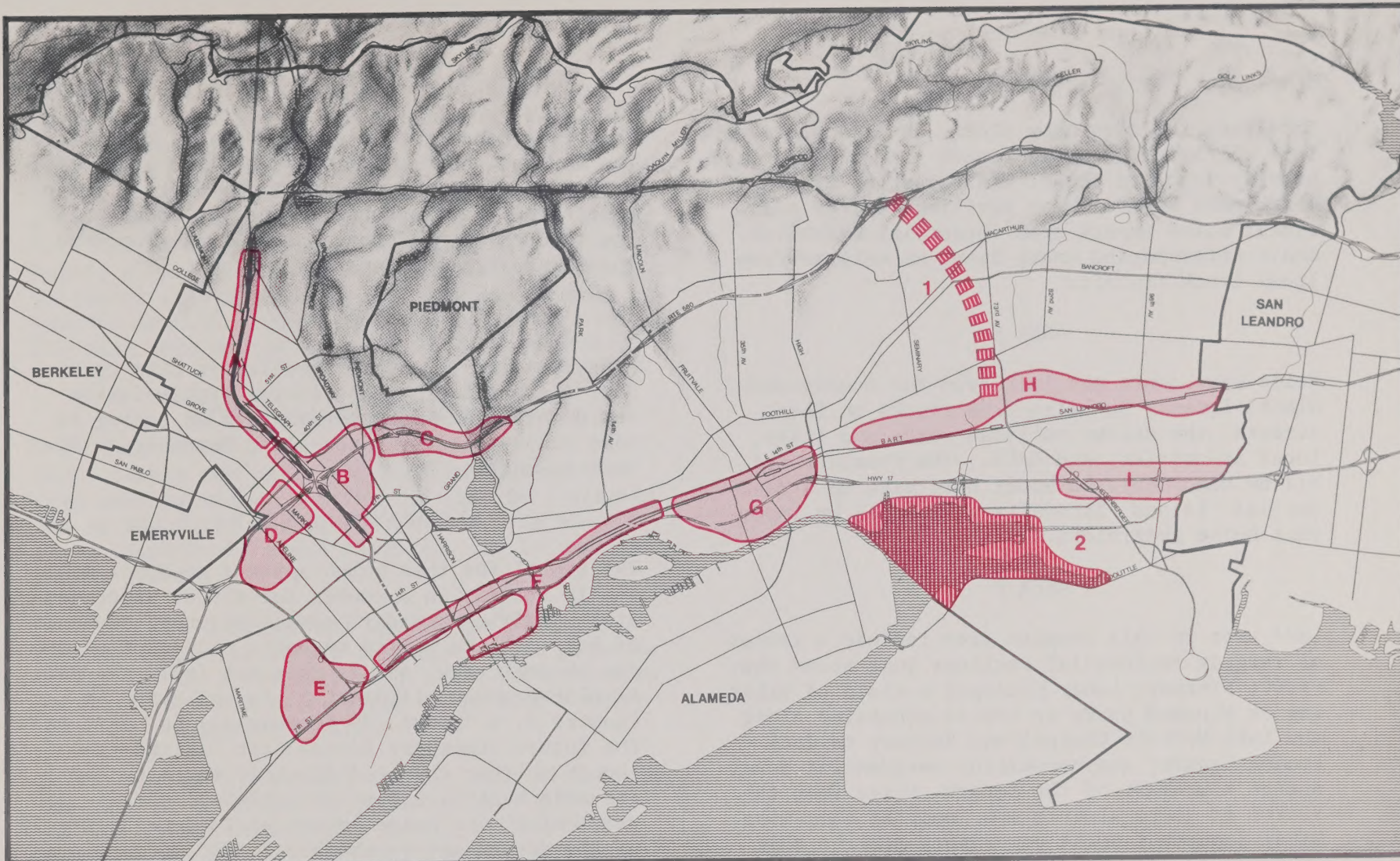
Within this area the Grove-Shafter Freeway meets the elevated MacArthur Freeway in a massive four-level interchange. The noise from these freeways, and from important nearby streets like MacArthur Boulevard and Broadway, affects many noise-sensitive uses nearby. These include numerous homes and apartments, a popular community park--and the East Bay's biggest concentration of medical activities. "Pill Hill" with its three hospitals and related facilities is immediately southeast of the freeway interchange, while Kaiser Hospital is nearby at the corner of Broadway and MacArthur Boulevard. In the future the noise problem might become worse, due not only to increasing traffic but because new medical, office, and apartment construction is likely.

AREA C

Noise contours along this part of the MacArthur Freeway are quite wide--partly because trucks are allowed as far east as Grand Avenue. This situation is especially important here because large numbers of apartments have been (and may continue to be) built near the freeway.

¹Although not within Oakland, portions of Bay Farm Island (in Alameda just west of the Oakland Airport) could be identified, at least potentially, as a noise problem area. The land here is still largely vacant or in agricultural use, but proposals for large-scale residential and other development here have been under consideration. Inappropriate development here could greatly increase the number of people exposed to significant noise levels from the Airport.

²Code letters and numbers are keyed to Map 4.



Map 4

Selected Problem Areas And Issues

- Existing Critical Noise Impact Area
- Noise-Relevant Circulation Issue

Note: code letters and numbers are
keyed to text



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AREA D

This area includes many older, small-scale dwellings which suffer noise impact from the elevated, heavily-traveled Nimitz and MacArthur Freeways which meet here. These dwellings suffer additional noise impact from industrial establishments interspersed among them, as well as from local truck traffic.

AREA E

Noise here comes not just from the double-deck Nimitz Freeway but also from trucks on local streets, the nearby railroad yards and lines, local industries, and BART. The Prescott and Willow Manor neighborhoods here make up a residential "island" literally surrounded by important noise generators.

AREA F

Land uses in this complex area include a series of largely residential sections just above the Nimitz Freeway; Laney College; a chain of existing or planned parks or trails extending along the Lake Merritt Channel and Estuary to Jack London Square; and commercial-residential development southeast of the Square. Noise from the Nimitz is quite audible over most of this area. Other important noise generators are the main Southern Pacific and Western Pacific tracks which cut through part of this area on closely parallel rights-of-way. Some noise also comes from operations at Alameda NAS.

AREA G

The situation here is like that in Area E. A district of old dwellings (sometimes called the Kennedy Tract) is bordered--and penetrated--by industrial facilities and important transportation routes. The latter include the Nimitz Freeway and other noisy truck routes; BART; and the closely parallel Southern Pacific and Western Pacific main lines.

AREA H

This long band of territory generally follows the boundary between the East Oakland industrial belt and adjacent residential districts. Noise comes from the truck routes and railroads passing through or near here, as well as from some local industrial plants and BART.

AREA I

Freeway noise is a major problem in this corridor, which runs through several single-family residential neighborhoods as well as taking in some noise-sensitive uses along Hegenberger Road such as motels.

CIRCULATION ISSUE 1

The symbol for this which appears on Map 4 actually stands, in a sense, for a much wider general "traffic corridor" across the neighborhoods of East Oakland. (The symbol's placement on the map is arbitrary, and it does not imply any particular roadway alignment.) As explained in Chapter 3, a "Route 13" freeway may be built in the future somewhere across East Oakland--although neither the need for this facility nor its alignment have been established. If it were built, its noise impact would depend largely on its design and on whether trucks were allowed on it. Also, this facility would need to be considered in connection with the parallel surface routes (High Street, Seminary, 98th, etc.) which cross East Oakland. For example, if a freeway were built in a depressed cross-section, it might conceivably reduce noise on nearby parallel streets by diverting traffic from them. This and other factors would need to be carefully examined when and if a specific proposal is ever developed here.

CIRCULATION ISSUE 2

This "issue" here really relates to several possible new or expanded trafficways (and a possible

airport-access transit route) which have been under consideration in the vicinity of San Leandro Bay. Depending largely on their precise alignment and design, these circulation proposals could have some adverse noise impacts on at least parts of the major park which is planned for San Leandro Bay. It is expected that this park will accommodate a variety of recreational uses. Some may be active such as boating and some may be more passive such as birdwatching or picnicking, but for most some degree of quiet will be desirable.

The Basic Options

Noise levels and noise problems in Oakland have been getting worse, not just in the areas singled out on Map 4 but throughout Oakland. In many cases significant noise increases can be expected in the future.

The City could either (1) accept the situation, making no special effort to combat noise problems, or (2) follow a strategy to prevent further noise increases and reduce existing noise levels where they are unacceptably high.

If it chooses the latter, then it must also decide how much of an effort it should make. Noise reduction is not without its costs, either direct (such as the cost of building a noise barrier along a roadway) or indirect (such as foregoing the possible economic benefits from development in a moderately noisy location). In other words, there are some trade-offs between noise reduction and other values. Another factor in deciding the level of the City's own effort is the assumed effectiveness of national and State noise reduction efforts.

The next chapter will address these questions by proposing appropriate City policy.



Policies and Programs

The policies and programs recommended here are based primarily on the following goal:

- *To prevent or reduce exposure to excessive or annoying noise.*

However, this is not the only goal that is relevant to noise control efforts. One must also consider the other goals in the Oakland Policy Plan, of which the following are the most relevant:

- *To provide for the safe, fast, and efficient movement of people and goods within Oakland and between Oakland and other parts of the region by an integrated system of streets, freeways, public transit, and other transportation facilities.*
- *To develop a healthy economy and reduce hard-core unemployment.*
- *To advance Oakland's position as a regional center of commerce, industry, recreation, and culture.*

- *To improve Oakland's physical environment and to preserve the natural qualities of Oakland's setting.*

Listing these other goals is not meant in any way to downgrade the importance of the "noise" goal. The point is that no goal by itself is absolute. In some specific cases, noise reduction efforts may conflict with other values. For example, in certain situations major traffic speed reductions--for the sake of noise control--could interfere with the "safe, fast, and efficient movement" goal; so could curtailment of or curfews on aircraft operations. Or there might be cases where the installation of large roadside noise barriers would conflict with the "physical environment" goal.

What is intended is a balancing among the various desirable but partially conflicting goals--a strategy which calls for vigorous noise control efforts but also recognizes the City's other concerns.

This strategy also relies partly on assumptions about the level of noise control efforts undertaken by other governmental agencies. These are already extensive, and in certain fields the City need do little or nothing to supplement them.

This chapter's three main sections begin by outlining the most significant existing programs, at all levels of government. They then present recommended policies. (Some of these are policies already adopted by the City, while another of them is a modification of an existing policy; however, many of them are new policies developed specifically to deal with noise.) Finally, each section recommends or suggests new noise-related programs or changes in existing ones.

General Considerations

It is appropriate to look first at some matters which affect noise control in general.

EXISTING PROGRAMS

With increasing concern about noise in recent years, there have been more and more efforts to combat it. Some have involved private firms or nonprofit or professional organizations. For example, the League of California Cities has published a report making many noise control recommendations.¹

However, the most prominent trend has been the increasing involvement by all levels of government. The jurisdictional pattern is still very complicated, largely due to the great variety of noise sources and the great variety of techniques for dealing with noise.

In the Noise Control Act of 1972 Congress recognized that Federal action is essential to deal with major noise sources which require national uniformity of treatment. The law provides for establishment of Federal noise emission standards for interstate carriers and for new products, and requirements that emission and/or reduction characteristics be printed on new product labels. It also authorizes the Environmental Protection Agency (EPA) to help state and local governments in developing their own noise regulations (where control is not preempted by Federal law) and to coordinate the Federal Government's extensive noise research. Also, as discussed later, there are important Federal standards affecting aviation and Federally-assisted highways and housing. Other Federal legislation limits on-the-job noise exposure for certain classes of industrial workers. The "environmental impact statement" requirements for certain Federal or Federally-assisted projects should also be mentioned, since noise

can be an important type of project impact.

The State of California has also been quite active. It has taken the initiative on aircraft and motor vehicle noise and on noise insulation standards for apartment buildings. It also has established on-the-job noise exposure standards to protect most types of industrial workers. On a more general level, the State's environmental impact review guidelines list "substantial detrimental effect..on ambient noise levels in adjoining areas" as one factor.² There is also, of course, the State law (Section 65302(g) of the Government Code) which requires each city to have a noise element in its general plan. Unfortunately, this law is confusingly written, and specifies more than is appropriate in requiring a general plan element. Further confusion results because there are discrepancies between this law and the new Noise Insulation Standards which try to tie in with it. In 1973 the California Noise Control Act did establish a State Office of Noise Control to provide technical assistance to local agencies --and to help coordinate the State's many noise control efforts. However, the office has a very small budget.

Although the regulation of individual noise sources (especially transportation sources) has been largely pre-empted at Federal and state levels, local jurisdictions still have extensive power to control land use, traffic, and the operation of equipment so as to minimize noise impact. The control of individual "nuisance-type" noise may be especially well adapted to local control. Oakland has a general nuisance law dealing with "unnecessary" or "persistent" noises (Sections 3-1.01 through 3-1.03 of the Oakland Municipal Code), although it is quite general in nature and

¹Quiet City Committee, Los Angeles County Division, League of California Cities, Quiet City Report (including a Model Noise Ordinance) (1973).

²Office of the Secretary for Resources, Guidelines for Implementation of the California Environmental Quality Act of 1970 (Sacramento: as amended through March 30, 1974), page 18.

sets no quantitative limits. Other relevant City programs or regulations include various zoning and Building Code provisions; the City's environmental impact review procedure, which supplements the State's guidelines; and the noise-related construction specifications which have been used on some street work contracts.

The Alameda County Health Care Services Agency, as time permits, offers advice or technical assistance to local firms and agencies with noise problems. The County is also involved in noise control planning around airports, as discussed later.

POLICIES

It is clear that any comprehensive strategy for noise reduction will require many different types of actions, undertaken at Federal, state, regional, and local levels. The scale and type of City efforts must be related to this broader framework.

A noise reduction strategy should also have targets, desirably in the form of specific noise levels appropriate to each type of land use or area. Unfortunately it is impracticable to recommend these in precise form at this time. This is largely because there is still widespread disagreement, nationally and in California, on what standards--even what measurement scale--should be used. Accordingly, policy 3 below contains only a non-quantitative standard, along with a statement that the City will develop more precise standards as early as feasible. Hopefully this will be soon.

The following policies are recommended:

1. *The City urges other governmental agencies at all levels, as well as private firms and organizations, to make vigorous, coordinated efforts to combat excessive or annoying noise.*
2. *The City will make every reasonable effort to do its own part in noise control and*

reduction. As appropriate, this will include improvements in circulation design and control; improvements in land use and other regulations; and review of the City's own activities, such as street work and street sweeping, to ensure that noise therefrom has been reduced to the lowest feasible levels.

3. *Exterior noise levels in each section of Oakland should be restricted or eventually reduced to levels which are compatible with the types of land uses located there. As soon as practicable, the City will develop more specific noise level standards for each type of area.*

PROPOSED PROGRAMS

Because of the variety of efforts needed to control noise, as well as the technical nature of the subject, coordination, liaison, and sharing of information and ideas will be of crucial importance.

The following programs or actions are recommended or suggested:

1. Adequate funding should be given to the Office of Noise Control (or to some comparable agency) to enable it to do the kind of state-wide coordination and assistance that is called for. It should review and compare all State laws dealing with noise, looking especially for inconsistencies, and recommend changes where needed.
2. In particular, the State's Noise Element law should be clarified and simplified.
3. Oakland's Noise Element, as well as other relevant parts of the Oakland Comprehensive Plan as necessary, should be revised and updated as more noise data become available and as thinking on desirable noise standards develops.
4. The City should consider the feasibility of enacting a comprehensive noise ordinance

dealing specifically with such things as construction noise, amplified sound, sound from special events, and loud or unusual noises. San Francisco already has such an ordinance. It has also employed an inter-agency task force in administering the ordinance--an approach which Oakland might consider.

5. The City should explore the feasibility of new procedures for "keeping its own house in order". For example, specifications for new City vehicles and equipment might include maximum noise emission standards.
6. The City should carefully consider noise factors in its environmental impact review procedure. Specific sound level data might be required for projects which could generate significant amounts of noise.

Circulation Design and Control

Since transportation facilities are usually the dominant noise generators, the appropriate design of these facilities or the appropriate control of traffic on them can be important ways to reduce noise. Even more basically, the noise emission levels of vehicles and aircraft themselves can be modified.

EXISTING PROGRAMS

The Noise Control Act of 1972 authorized the EPA to establish noise limits for interstate trucks and railroads, and specific standards for these are now under consideration. EPA is also preparing regulations for aircraft, trucks, cars, and other new products.

The State already has such regulations. These apply to all new cars, trucks, and motorcycles sold after January 1, 1973, and involve a gradual tightening of standards through 1987. For example, the maximum sound level for automobiles (at a distance of 50 feet) was 86 dBA in 1972 but will be reduced, in steps, to 70 dBA by 1988. If these controls are retained and ade-

quately enforced, very significant noise reductions will result on many trafficways in the long run.

In addition, the State has existing controls setting maximum noise limits at which any vehicle can be operated on the highway.

Certain other traffic controls can also help reduce noise. One example which has already been mentioned is the truck ban on the MacArthur Freeway east of Grand Avenue. In addition, the Oakland Traffic Code bars heavy trucks from various streets on Pill Hill and near Lake Merritt, as well as from a few scattered streets in other parts of the City. It also designates a series of "truck routes" which truckers are supposed to use where reasonably convenient, but many of these are unsigned and therefore difficult to enforce.

Various existing speed limits may also affect noise levels to a degree. For example, the State's 55 miles per hour limit which was imposed during the national energy crisis seems to have produced some noticeable reductions.

As for the trafficways themselves, the Federal Highway Act of 1970 requires that noise factors be considered in locating or designing Federally assisted highways. The United States Department of Transportation has accordingly issued noise impact standards in its "Policy and Procedure Memorandum 90-2". Similarly, the California Department of Transportation considers noise impact in its freeway planning, and it may also pay for some kinds of special abatement measures such as barriers. Soundproofing work may be paid for on schools which predated an adjacent freeway, if the noise intrusion exceeds certain limits. Partly in response to Federal and State guidelines, the City has made special efforts on some recent street construction projects. On a current widening project along 73rd Avenue, for example, the contract calls for special paving designed to reduce noise.

In dealing with aircraft noise, the Federal Aviation Administration administers regulations which limit the sound levels produced by different classes of new aircraft. Some of FAA's flight

operation standards, especially those dealing with minimum altitude and "preferred runways", also take noise factors into account. (The EPA is now studying the Federal aircraft noise regulations, and is in the process of recommending new standards to the FAA.)

In 1971, California was the first state to introduce noise standards which require operators of State-licensed airports to institute noise reduction practices. The law requires each airport declared to have a "noise problem" to monitor noise and map noise contours to show whether there are residential uses exposed to certain noise levels, the standards for which become progressively more restrictive between now and 1986. If an airport is in violation of the noise standards, then various means of sound reduction must be attempted such as switching to quieter aircraft; changing the frequency, pattern, and hours of operation; installing special shielding; or encouraging the appropriate development of adjacent land uses. If the problems cannot be eliminated through these options, the airport operator can seek variances, each of one year's duration.

The Port of Oakland has a formal noise monitoring program at the Airport, and reports the results to the County of Alameda on a quarterly basis. The Port has also adopted its own noise abatement procedures which apply to the "north airport".

The Department of Defense now requires military air bases to consider noise impact in their operations. As noted in Chapter 3, Alameda NAS has adopted some significant abatement procedures.

POLICIES

Noise reduction can be achieved both through careful planning of new transportation facilities and through modification of (or special traffic controls on) existing ones. However, the necessary extent of such actions will depend partly on the effectiveness of national and state efforts to reduce vehicle noise. For example, if cars and trucks can be made

significantly less noisy in the near future, relatively fewer special efforts such as the construction of noise barriers will be needed.

The following new policies are recommended:

1. *Wherever feasible, any new or expanded major traffiaway should either (a) be routed through those areas containing land uses which can tolerate its anticipated future noise impact or (b) incorporate special design features or traffic controls which will effectively offset this impact.*
2. *If any new freeway section is built through residential portions of East Oakland, it should either be depressed below grade for most of its length or incorporate other special design features or traffic controls which will achieve a substantially equal noise reduction.*
3. *To the maximum extent feasible, new or expanded traffiaways through or adjoining areas containing park or recreational uses should be planned to minimize their noise impact on such uses.*
4. *Along existing surface transportation routes the noise from which is seriously affecting nearby noise-sensitive land uses, where a continuation of excessive noise levels is likely for the near future, vigorous and systematic noise reduction efforts should be made through such means as special barriers or traffic controls.*

Several general circulation policies which are already in the Policy Plan are repeated below because they also have noise implications. For example, one of them is intended to get people to leave their cars at home and use two inherently quiet circulation systems: walking and bicycling.

- *In order to prevent the City of Oakland from being sacrificed for the commuting convenience of suburban dwellers of the San Francisco Bay Area; in order for residents of Oakland*

to have a greater share of job opportunities in Oakland; in order to prevent further destruction and isolation of Oakland's neighborhoods, which presently have weak physical identities; and in order to give BART (the Bay Area Rapid Transit District) an opportunity to have a substantial effect on transportation patterns of the Bay Area, the City Council will oppose all freeway construction in Oakland that would increase these problems without compensating benefits to Oakland. The Council directs the appropriate departments to develop viable alternatives such as parkways and landscaped arterials.

- It must be shown that any traffiway construction:
 - (a) will primarily serve the transportation needs of Oakland's residents;
 - (b) will be beneficial to Oakland's residents in expanding job opportunities;
 - (c) will not destroy or disrupt Oakland's neighborhoods and will not impose unnecessary barriers between neighborhoods, nor separate residents from their waterfront; and
 - (d) will have allowed the assessment of the impact that BART will have on transportation patterns of the San Francisco Bay Area.
- Local streets should be used primarily for access to abutting property. Their design should discourage all through traffic and should respect the importance of pedestrian movement. Where through traffic uses existing local streets, every opportunity will be explored in small-area planning to divert such traffic to arterial streets.
- To relieve the almost total dependency on automotive travel within urbanized areas of the region, the City actively encourages

the development of a comprehensive and totally integrated system of mass transit as well as other alternatives.

- The use of mass transit will be encouraged and facilitated in small-area planning where the relationship of BART feeder lines to neighborhood development patterns will be explored.
- A city-wide system of "pedestrianways" and bicycle paths will be developed. They should be provided especially in areas of heavy foot traffic and in locations of unusual visual, community, or historical significance.
- The City Council urges all railroads to work toward eliminating marginal trackage and establishing joint trackage, and the City will actively encourage such a process.

PROPOSED PROGRAMS

Reducing noise levels associated with circulation facilities will need to involve the many different agencies which build, operate, maintain, or regulate them. Once again, coordination is vital.

The following programs or actions are recommended or suggested:

1. The Federal Government and the State should enact or continue strong controls designed to reduce noise emissions from motor vehicles, railroad operations, and aircraft. Even more importantly, they should provide adequate means for enforcing such standards.
2. The City should give careful attention to noise factors as part of its own continuing transportation planning. Analysis of noise data and potential noise impact should be a routine part of the project design process. The City should work closely with other agencies involved in transportation planning, and urge them to give similar attention to noise factors.

3. Various actions should be undertaken to encourage the use of mass transit and to provide bikeways and pedestrianways. (See the Circulation Element of the Comprehensive Plan.)
4. The City should consider urging the State to retain the present 55 miles per hour speed limit for all freeways within Oakland.
5. In addition, the City urges the State to undertake a systematic program of noise reduction along those existing freeway or highway sections in Oakland where a continuation of serious noise problems can be foreseen. In particular, the City urges the State to take action to reduce noise levels on the MacArthur Freeway in the Lakeshore and Mills College areas and on the Nimitz Freeway near Lazeur School. The City and the State could jointly work out a priority rating system for deciding which other sections should be given first attention. A variety of noise reduction techniques might be used, singly or in combination, such as further lowering of speed limits, controls on trucks, or installation of roadside barriers. Gas tax money could be used for at least some of these efforts.
6. In particular, the feasibility should be considered of banning trucks from that portion of the MacArthur Freeway extending from Grand Avenue to the Grove-Shafter Freeway.
7. The City should explore the feasibility of various means to reduce excessive noise along existing City streets. For example, the Oakland Traffic Code might be amended to impose additional route restrictions on trucks. This might be especially valuable in some areas of housing along the edge of the industrial belt where trucks make shortcuts along minor residential streets.
8. To the best of its ability, the City should diligently do its part in enforcing the State's general noise controls on cars, trucks, and motorcycles.
9. The City should urge BART and the railroads operating in Oakland to also undertake significant noise reduction efforts. For example, some form of barriers at wheel level would be highly desirable along those elevated BART structures which pass through residential sections. Some possibilities for reducing railroad noise include the use of improved track welding techniques and the lowering of speeds near residential areas.

Land Use Design and Control

Another approach to noise control involves requiring or encouraging the appropriate location and design or operation of land uses. Depending on use and location, this can be done (a) to protect the occupants of the land uses from undesirable noise levels, (b) to prevent the land uses themselves from producing excessive noise, or (c) to keep noise-sensitive land uses out of inappropriate locations where they might hinder the operation of facilities such as airports and industries which are important to Oakland or the Bay Region.

EXISTING PROGRAMS

HUD's noise exposure standards for Federally assisted housing have already been mentioned.

The State's new Noise Insulation Standards establish performance criteria for all new apartments, two-family dwellings, townhouses, hotels, and motels. Standards are set both for sound transmission between dwelling units and, at least in noisy areas, for insulation from outside noise sources. (The City's own Building Code, which also is applicable, has been amended to include essentially similar standards for sound transmission between dwelling units.)

The Zoning Regulations of the Oakland Planning Code contain various provisions which affect noise either directly or indirectly. Perhaps most important is the zoning pattern itself, which determines what land uses are allowed in what areas. The "industrial zones" in which most of Oakland's factories and warehouses are found exclude new residential uses, partly to avoid exposing potential occupants to the noise from industries, railroads, and heavy trucks. Unfortunately, though, nonconforming older houses can still be found in some industrially zoned sections, and their occupants generally have little protection against nearby noise. As for residential zoning, higher densities tend to be allowed in the noisier areas of the City. In particular, thin ribbons of high-density zoning cover the properties fronting on a number of heavily traveled streets. Residential uses are also permitted in most commercial zones.

The "discretionary review" procedures in the Zoning Regulations, such as the use permit requirement for certain activities, sometimes provide the means for case-by-case review of potentially noisy uses.

The part of the Zoning Regulations which deals most specifically with noise is the "Performance Standards", which has quite detailed decibel limits. However, these standards are not retroactive--that is, an industry that is already noisy can keep on being noisy--and they do not apply in commercial zones or in most areas zoned industrial. Furthermore, the standards themselves refer to a complicated set of frequency ranges which are no longer in general use, and this makes it quite difficult to measure compliance.

Another type of land use control is exercised by the County's Airport Land Use Commission (ALUC). This body, made up of representatives from various local agencies and airports, has been established in compliance with State law to exercise land use planning and control around all civilian airports in Alameda County. The prime criterion for this is noise exposure, although hazards to

and from aviation are another concern. The ALUC has established a line of demarcation for residential developments near Metropolitan Oakland International Airport, and has adopted a general land use plan, which includes much of Oakland and adjacent cities. New land uses which do not conform to this plan may be disapproved by the ALUC, but such disapproval is subject to overruling by a four-fifths vote of the affected governing body.

POLICIES

A discussion of land use control with respect to noise factors reveals, again, some potential conflicts between different goals. In particular, it may be desirable for other reasons to cluster higher-density residential uses (thereby incidentally reducing traffic and traffic noise in the remaining, lower-density areas) and to have the highest densities in the most accessible locations. Yet these are sometimes the noisiest locations.

What this suggests is that, in determining the density pattern, noise levels and other environmental factors must also be taken into account. Therefore policy 3 below is the result of modifying an existing policy (encouraging concentration in areas of high accessibility) to take these into account.

However, in relating the land use pattern to noise levels one should also keep in mind the prospects for future reductions in transportation noise--either through quieter vehicles or special roadway design or traffic controls. If clearly desirable for other reasons, higher-density development might be acceptable in some locations near presently noisy streets or freeways if noise reductions along the trafficway can reasonably be expected in the foreseeable future.

Also, a new development in an otherwise-too-noisy area may be acceptable if the project itself incorporates special noise reduction features.

As for land uses which are themselves noisy, the Policy Plan already contains two policies (policies 4 and 5 below) which deal explicitly with noise.

The following policies are recommended:

1. *New land uses and density increases should generally be discouraged in areas where the noise levels likely in the foreseeable future exceed what is reasonably acceptable for such uses, except where a project itself has special features which will reduce on-site noise to an acceptable level.*
2. *The City strongly opposes the continued development of Bay Farm Island or other areas near the Metropolitan Oakland International Airport in such a manner as to hamper desirable growth of the Airport or to expose the occupants of such development to excessive noise levels.*
3. *To the extent compatible with noise levels and other environmental factors, the intensity of development at each point in the City should be related to the degree of accessibility there.*
4. *Residential areas should be protected from activities which produce excessive noise, dirt, or odors or generate heavy traffic.*
5. *Industrial nuisances such as smoke, dust, odors, and noise should be adequately controlled.*

There are also several existing policies which, while they do not mention noise explicitly, still have significant noise implications:

- *Many of the small industries now scattered through residential areas should be re-located in the industrial belt in the interest of more harmonious and economic land use.*
- *Commercial areas should be developed in such a manner that they do not harm adjacent residential areas.*
- *Buffer areas, formed by some combination of off-street parking, general commercial*

uses, and parks or parkways, should separate industrial areas from residential areas.

- *New residential uses should be excluded from areas planned for industrial use.*

PROPOSED PROGRAMS

The following programs or actions are recommended or suggested:

1. After initial experience is gained in administering the State's new Noise Insulation Standards, the City should study the possibility of recommending some changes in it and in the City's own related Building Code provisions. Possible changes might include extending requirements to additional types of structures and requiring retroactive sound-proofing for at least some types of buildings or situations.
2. The noise performance standards in the Zoning Regulations should be revised and updated. (Possibly they might then be incorporated into the kind of comprehensive City noise ordinance discussed earlier.) The standards might be applied in more (or even all) zones, with actual noise limits varying between zones. They might also be made retroactive, at least in some cases.
3. The City's existing zoning pattern, and the pattern of permitted uses and densities which corresponds to it, should be re-examined in light of the policies in the Noise Element. In particularly noisy locations, changes should be considered which would discourage noise-sensitive land uses. As for the pattern of higher-density zoning, consideration should be given to replacing some of the present thin ribbons along heavily traveled streets with selected clusters or corridors wide enough to allow some spacing between apartment houses and some siting of them on quieter side streets.
4. In reviewing conditional use permits and

other discretionary zoning cases, the City should carefully consider relevant noise factors. In some cases the concern may be the impact of a proposed use on its surroundings, while in others the real issue may be the effect of nearby noise sources on the project's own occupants.

5. In addition to statutory controls, the City (or other appropriate agency) should consider preparing suggested design and site planning guidelines, which would illustrate techniques for minimizing noise emission or noise exposure.
6. The City will continue to assist the Airport Land Use Commission and other relevant governmental agencies in encouraging the compatibility of nearby land uses with the growth of air traffic at Metropolitan Oakland International Airport.

Appendix

SOURCES AND METHODOLOGY

In preparing the Noise Element, the City Planning Department:

1. sought information or suggestions from a large number of agencies or organizations;
2. employed noise level data provided by the operators of major transportation facilities;
3. examined many relevant reports.

CONTACTS

The following agencies or organizations were consulted or made suggestions:

1. Alameda, California, City Planning Department.
2. Alameda County, California, Health Care Services Agency, Division of Environmental Health.
3. Alameda County, California, Planning Department
4. Association of Bay Area Governments (ABAG).
5. Atchison Topeka and Santa Fe Railway Company.
6. California Commission of Housing and Community Development.
7. California Department of Public Health, Office of Noise Control.
8. California Department of Transportation.
9. California Division of Aeronautics.
10. California Division of Bay Toll Crossings.
11. California Office of Planning and Research.
12. California Office of the Attorney General.
13. California Public Utilities Commission.
14. Comprehensive Planning Organization of the San Diego Region.
15. Contra Costa County, California, Planning Department.
16. Capitola, California, city planning department.
17. Cerritos, California, city planning department
18. Fremont, California, City Planning Department.
19. Fresno County, California, planning department.
20. Hayward, California, city planning department.
21. Inglewood, California, Planning and Development Department.
22. Irvine, California, city planning department.
23. Long Beach, California, city planning department.
24. Los Angeles, California, Department of City Planning.

25. Los Angeles County, California, Planning Department.
26. Marin County, California, Planning Department.
27. Metropolitan Transportation Commission (Bay Area).
28. Oakland, California, Building and Housing Department.
29. Oakland, California, Office of Public Works.
30. Oakland, California, Office of the City Attorney.
31. Oakland, California, Office of the City Manager.
32. Oakland, California, Traffic Engineering and Parking Department.
33. Oxnard, California, Planning Department.
34. Palo Alto, California, city planning department.
35. Port of Oakland, California.
36. Richmond, California, City Planning Department.
37. Rockridge Community Planning Council.
38. Sacramento, California, City Planning Department.
39. San Diego, California, city planning department.
40. San Francisco Bay Area Rapid Transit District (BART).
41. San Francisco, California, City Planning Department.
42. San Francisco, California, Department of Public Works.
43. San Jose, California, city planning department.
44. San Leandro, California, city planning department.
45. San Mateo County, California, Planning Department.
46. Santa Ana, California, city planning department.
47. Southern Pacific Transportation Company.
48. U. S. Department of Transportation, Federal Aviation Administration.
49. U. S. Environmental Protection Agency.
50. U. S. Navy Department, Alameda Naval Air Station, Environmental Control Officer.
51. U.S. Navy Department, Naval Facilities Engineering Command, Western Division.
52. Ventura County, California, planning department.
53. Western Pacific Railroad Company.

NOISE LEVEL DATA

Noise contours, drawn on aerial photographs or other base maps, were provided by various parties responsible for different major transportation facilities. For example, the California Department of Transportation prepared contours for State highways, and the Port of Oakland provided contours for Metropolitan Oakland International Airport. In each case these were based on widely used noise estimation procedures or adaptations thereof.

Chapter 3 has already stated various qualifications about the nature of these contours and cer-

tain assumptions on which they are based.

The contours were generally carried down to either 65 or 60 dBA, but in a few cases they were taken down further. This was done because of the following sentence in Section 65302(g) of the Government Code: "For regions involving hospitals, rest homes, long-term medical or mental care, or outdoor recreational areas, the contours shall be continued down to 45 dB(A)." It was assumed that this requirement applies only inside distinct "regions"--whole areas such as Oakland's Pill Hill medical district--which are characterized by such facilities, rather than applying near every individual facility of the types listed. If one were to interpret the requirement instead to apply to all individual facilities (such as neighborhood recreation centers), which may be scattered very widely across a city, it might almost apply everywhere; and that interpretation seems unreasonable.

It was further assumed that even in actual districts characterized by these types of uses, the contours need not be carried down any further than the local ambient noise level.

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Reports which were consulted include the following:

1. Bolt Beranek and Newman, Environmental Studies: Aviation Noise Evaluations and Projections, San Francisco Bay Region, Regional Airport Systems Study (Bay Area Study of Aviation Requirements and Association of Bay Area Governments), August, 1971.
2. _____, Fundamentals and Abatement of Highway Traffic Noise, U.S. Department of Transportation, Federal Highway Administration, Office of Environmental Policy, distributed by U.S. Department of Commerce, National Technical Information Service, June, 1973.
3. Branch, Melville C. et al., Outdoor Noise and the Metropolitan Environment: Case Study of Los Angeles with Special Reference to Aircraft, Los Angeles, Department of City Planning, 1970.
4. California Council on Intergovernmental Relations, General Plan Guidelines, Sacramento, September, 1973.
5. California Office of the Secretary for Resources, Guidelines for Implementation of the California Environmental Quality Act of 1970, Sacramento, as amended through March 30, 1974.
6. Comprehensive Planning Organization of the San Diego Region, Environmental Noise Background and Policy Study: Detailed Study Design, San Diego, revised May 24, 1973.
7. _____, Environmental Noise Policy Study: Draft for Action, San Diego, April, 1974.
8. General Radio Company, A Primer of Noise Measurement, Concord, Massachusetts, 1972.
9. Harmelink, Milton D. and Hajek, Jerry J., "Highway Noise Control," Traffic Engineering, September, 1973, pp. 47-53.
10. Inglewood, Calif., Planning and Development Department, Environmental Standards Division, Community Noise Control Training Guide and Enforcement Manual (Draft Circular), June, 1971, revised 1972.
11. _____, Community Noise Study, August, 1972.
12. _____, Inglewood General Plan Noise Element (draft), November, 1972.
13. Irvine, Calif., Planning Department, Transportation Noise Element (draft), date unknown.

14. League of California Cities, Los Angeles County Division, Quiet City Committee, Quiet City Report (including a Model Noise Ordinance), 1973(?).
15. Marin County, Calif., Planning Department, Environmental Impact Report on the Marin Countywide Plan (draft), April 3, 1973.
16. Oakland, Calif., Office of Public Works, Negative Declaration (and Noise Report) for East Oakland Cross Town Arterial (73rd Avenue--East 14th Street to Bancroft Avenue), December, 1972.
17. Oakland, Calif., Transportation Task Force, Report to the Mayor and City Council on the Interim Circulation Element, October 9, 1973.
18. Oxnard, Calif., Planning Department, Oxnard-2000 GP Noise Element Phase 1, Criteria and Background, September, 1973.
19. Pleasanton, Calif., Department of Community Development, Noise Element, Pleasanton General Plan, Draft Revision #2, December, 1973.
20. Richmond, Calif., City Planning Department, Richmond Coastline Plan, January, 1973.
21. Sacramento, Calif., City Planning Department, Draft Environmental Impact Report on 1974 General Plan, date unknown.
22. San Diego, Calif., Planning Department, Noise Element (draft), June, 1974.
23. San Francisco, Calif., City Planning Department, "Noise Element Report Outline" (draft), April 17, 1974.
24. _____, "Objectives and Policies for Noise Element" (draft), May 2, 1974.
25. Schultz, Theodore J. and McMahon, Nancy, Noise Assessment Guidelines (BBN Report No. 2176), Washington, U. S. Department of Housing and Urban Development, August, 1971.
26. Sublette, Russell W., "Noise and the Highway," APWA Reporter, March, 1974, p. 24.
27. U. S. Department of Transportation, Federal Highway Administration, Interim Noise Standards and Procedures for Implementing Section 109(i) Title 23 U.S.C. (Policy and Procedures Memorandum 90-2), April 26, 1972.
28. U. S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety, Washington, March, 1974.
29. Wyle Laboratories, Assessment of Noise Environments Around Railroad Operations, El Segundo, prepared for Southern Pacific Transportation Company, Union Pacific Railroad, Atchison Topeka and Santa Fe Railway Company, and The Association of American Railroads, July, 1973.
30. _____, Community Noise, Washington, U. S. Environmental Protection Agency, 1971.
31. _____, Development of Ground Transportation Systems Noise Contours for the San Diego Region, San Diego, Comprehensive Planning Organization of the San Diego Region, December, 1973 plus subsequent revisions.
32. _____, Transportation Noise and Noise from Equipment Powered by Internal Combustion Engines, Washington, U. S. Environmental Protection Agency, December 31, 1971.

O A K L A N D C I T Y C O U N C I L

Resolution No. 54264 C.M.S.

RESOLUTION ADOPTING THE NOISE ELEMENT OF
THE OAKLAND COMPREHENSIVE PLAN.

WHEREAS, the City Planning Commission has held a public hearing on consideration of adopting a Noise Element and making incidental additions and changes to the Oakland Policy Plan, thereby adding to and amending the Oakland Comprehensive Plan and Oakland's "general plan"; and

WHEREAS, the City Planning Commission has made its recommendations on these matters to the City Council; and

WHEREAS, subsequently the City Council has itself held a public hearing on these matters; and

WHEREAS, pursuant to the provisions of the California Environmental Quality Act of 1970, as amended, and City Council Resolution No. 53054 C.M.S. (adopting objectives, criteria, and procedures for implementation of said Act) the City Planning Commission has approved an Environmental Impact Report on the proposed Noise Element, which Environmental Impact Report consists of the document entitled Noise: An Element of the Oakland Comprehensive Plan and dated August, 1974, together with the additions and changes thereto and the supplemental material contained in or attached to the report entitled "Proposed Noise Element and EIR Thereon" and dated September 11, 1974; and

WHEREAS, the City Council has subsequently reviewed and considered said Environmental Impact Report; now, therefore, be it

RESOLVED: That the Council of the City of Oakland hereby amends the aforementioned Environmental Impact Report by adding "staff of the Federal Highway Administration" in the first sentence of the section entitled "COMMENTS," by adding a paragraph reading "Federal Highway Administration. See attachment." in the same section, by attaching the letter dated September 13, 1974 from the California Division of the Federal Highway Administration to the Oakland Director of City Planning, and by adding a paragraph reading "Federal Highway Administration. (No response needed.)" in the section entitled "RESPONSE TO COMMENTS"; and be it

FURTHER RESOLVED: That the City Council finds that the proposed Noise Element may have a significant impact upon the environment, and certifies that the aforesaid Environmental Impact Report as hereinabove amended, a copy of which is on file in the City Planning Department, has been prepared in compliance with the California Environmental Quality Act of 1970, as amended, and State guidelines; and be it

FURTHER RESOLVED: That the City Council finds and determines that the proposed Noise Element --which consists of the document entitled Noise: An Element of the Oakland Comprehensive Plan and dated August, 1974, with the additions and changes thereto listed in the report entitled "Proposed Noise Element and EIR Thereon" and dated September 11, 1974, along with the detailed noise contour maps referred to in Chapter 3 of the above document--provides an appropriate and systematic statement of noise levels and City goals, policies, and intentions regarding noise; and be it

FURTHER RESOLVED: That the City Council hereby adopts the aforesaid Noise Element, a copy of which is on file in the City Planning Department and is available there for inspection by the public; and be it

FURTHER RESOLVED: That the Noise Element hereinabove adopted is hereby declared to be a component of the Oakland Comprehensive Plan as well as Oakland's "general plan"; and be it

FURTHER RESOLVED: That the Oakland Policy Plan is hereby amended by establishing a noise section, by adding the appropriate goal and policy statements contained in the Noise Element, hereinabove adopted, to said section, and by adding or substituting said goal and policy statements to or in other sections, as appropriate.

I certify that the foregoing is a full, true and correct copy of a Resolution passed by the City Council of the City of Oakland, Calif., on September 17, 1974.

ROBERT C. JACOBSEN
CITY CLERK

Per *Shirley M. Simpson*
DEPUTY



C124881110

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